

Gaps in Personal Information Management Behavior of Higher Education Students: Implications for a Training Program

Lilach Alon
Tel-Aviv University
Israel
lilachalon@mail.tau.ac.il

Alona Forkosh-Baruch
Levinsky College of Education, Tel-Aviv University
Israel
alonabar@levinsky.ac.il

Rafi Nachmias
Tel-Aviv University
Israel
nachmias@tauex.tau.ac.il

Abstract: Efficient personal information management (PIM) is a growing need for students who manage personal information on multiple digital devices and platforms. Low PIM skills result in stress and low PIM ability. Implementing programs for enhancing PIM literacy improve students' PIM practices. This study suggests defining students' PIM needs by examining their actual and ideal PIM behavior, and defining characteristics of gaps between actual and ideal behavior. Participants included 287 higher education Israeli students, responding to a PIM practices questionnaire. Findings indicated that students utilized a variety of PIM practices, while ideally desired to utilize even more practices. Gaps between actual and ideal usage of practices were significant for 90% of the practices. Findings suggest that students are unsatisfied with their PIM behavior. We offer a 3-principle PIM literacy program for higher education students to narrow the gaps and enhancing PIM skills.

Introduction

Personal information management (PIM) is "the science of managing our own digital stuff" (Bergman & Whittaker, 2016). People manage personal information while utilizing various practices for acquiring, saving, maintaining and retrieving information items (Jones, 2007). These practices create the personal information space that contains all paper-based and digital-based information that people gather along their lives.

Nowadays, personal information spaces are more fragmented and divergent. Information items are saved not only on desktop computers, but also on multiple digital platforms, e.g. mobile devices, clouds, email accounts, and social networks (Vitale, Odom, & McGrenere, 2019). Consequently, management of one's personal information has become more difficult. Students in higher education face similar challenges, when required to manage numerous information items for academic as well as personal needs.

Therefore, the current study aims to examine the actual PIM behavior of students, which reflects the utilization of PIM practices, and to identify their ideal PIM behavior as they perceive it. Comparing the actual and ideal PIM behavior allows to examine the characteristics of the gaps between the two. Based on our findings, we will suggest principles for constructing and implementing a training program that enhances PIM literacy in higher education.

Students' PIM Behavior

Mioduser, Nachmias and Forkosh Baruch (2008) defined PIM literacy as one of the most important digital literacies for students in the 21st century. A Good PIM literacy is considered as the ability to properly save and organize information items in order to retrieve them later (Bergman & Whittaker, 2016). Previous studies found that the management of personal information spaces enhance students' learning processes. By reflecting on their information items and thinking how to arrange them properly, students give meaning to their information and promote their learning tasks (Hardof-Jaffe & Aladjem, 2018). Hence, PIM literate students are able to utilize creative and high-level practices that are suitable for their own needs (Alon, Hardof-Jaffe, & Nachmias, 2019).

Nevertheless, despite the importance of PIM literacy for students, studies indicate various difficulties and challenges that characterize their PIM experience. According to Trace and Karadkar (2017), students perceive PIM as challenging and difficult to utilize under overload of academic pressure and demands. Another study found that students are frustrated by the management of their overloaded information spaces and feel that there is a gap between their perception of actual use of practices and the ideal use of practices (Robinson & Johnson, 2012). Students also struggle to find proper digital platforms that could be suitable for their learning needs (Cushing & Dumbleton, 2017). Hence, there is a need to strengthen students' PIM skills in higher education, via a program that focuses on PIM literacy. Such a program could give the students guidance towards reflecting over their PIM behavior as well as practical tools for enhancing their use of PIM practices.

In order to construct and implement a PIM literacy program in higher education institutes, we need to define the program's goals and the students' needs based on an examination of their PIM behavior that include the actual utilization of practices, the ideal perceptions of how to manage information, as the gap between the two.

Gaps Between Actual and Ideal PIM Behavior

The majority of studies on people's PIM behavior examine utilization of certain practices, such as filing and piling, aimed to organize information on digital platforms (Whitham & Cruickshank, 2017), navigating between folders or using "search" to retrieve information items (Benn et al., 2015; Bergman & Yanai, 2018), and managing email messages (Whittaker, Matthews, Cerruti, Badnes, & Tang, 2011; Whittaker & Sidner, 1996). Jones et al. (2015) take a broader approach, examining 36 practices to define the most effective ones for managing information. While these studies shed light on specific aspects of people's practice utilization, they do not focus on the PIM behavior of students and do not address the PIM behavior as a whole, rather focus on specific practices. In addition, these studies do not address the question of how students would ideally like to manage their personal information.

Therefore, we defined three aspects of students' PIM behavior that should be examined: actual behavior, ideal behavior, and gaps between actual and ideal behavior. Actual PIM behavior refers to PIM practices that users utilize de facto to manage personal information items on digital platforms. These include various practices for saving, organizing and retrieving information items from digital platforms (Whittaker, 2011). Ideal PIM behavior refers to practices that users would like to utilize for managing their personal information. People may use specific sets of PIM practices while wishing to behave differently, for example, to increase or decrease their use of particular practices, or to change them altogether. Gaps between actual and ideal PIM behavior are associated with negative feelings and a sense of being unable to perform in a way that meets one's preferences and goals (Higgins, 1987; Rowe, Wilson, Dimitriu, Breiter, & Charnley, 2017).

Students who are frustrated with their PIM practices may feel they are less able to manage their personal information efficiently and may exhibit low PIM skills (Alon, Forkosh Baruch, & Nachmias, 2018). Therefore, we suggest that examining students' actual PIM behavior alongside with their perception of ideal PIM behavior, and measuring gaps between actual and ideal behavior, could assist in defining ways to assist students to elaborate their PIM skills as well as their self-efficacy to manage personal information.

The Study

To examine students' actual and ideal PIM behavior and to define the characteristics of the gaps between them, we asked the following research questions: 1. What are the PIM practices that students in higher education actually utilize? 2. What are the PIM practices that students would ideally utilize? 3. What are the gaps between actual and ideal PIM practices?

Participants

Participants included 287 students in higher education institutes in Israel, 54 male (18.8%), and 233 females (81.2%); ages ranged between 19 and 50 (\bar{x} =27.56, SD =6.07). Participants used 3 to 10 digital platform to manage their personal information (\bar{x} =7.64, SD =1.83). Figure 1 summarizes the frequencies of usage of digital platforms and devices for PIM.

Figure 1. Frequencies of usage of digital platforms (N=287).

As Figure 1 shows, students preferred to use mobile phones (92.6%), email accounts (90.9%), and laptops (90.6%) to manage personal information. Usage of devices and platforms for PIM was similar among male and female students but differed across ages. The older the student- the less he or she used online and mobile devices and platforms for the management of their personal information.

Tools

We collected data using a self- report questionnaire that we developed for the current study to examine the actual and ideal usage of PIM practices. The questionnaire included two parts: PIM practices and background information.

PIM practices: The development of this part of the questionnaire was based on existing literature (e.g., Bergman, Beyth-Marom, & Nachmias, 2008; Jones et al., 2015) and on a pilot study (Alon et al., 2019). To ensure the questionnaire's validity and reliability and to confirm its clarity, we performed a peer review process of five researchers in the field of PIM and a pilot sample. The final version of the questionnaire included 30 PIM practices divided into two sections: actual usage and ideal usage. The first section examined the actual usage of participants' PIM practices asking: "How often do you use each one of the following practices, between 1 (never) to 5 (always)?" The second section examined the ideal usage of the same PIM practices listed in the same order. The question was: "How much would you ideally like to use each one of the following practices, between 1 (never) to 5 (always)?"

Background information: This part included personal information (i.e., age and gender), and information on the use of the following digital platforms for PIM: laptop, desktop computer, mobile phone, external memory devices, email, cloud, personal website, PIM apps, social network, and personal pages in websites. Each platform was scaled on a 4-point Likert scale according to its importance for managing personal information. If not used, it was assigned 0.

Procedure and Analysis

Questionnaires were sent to students in higher education institutes in Israel via a link to Google Forms to ensure anonymity. We distributed the link using the snowball sample via posting on social networks (Facebook, WhatsApp) and on websites of courses in Israeli higher-education institutes. When addressing potential respondents, we mentioned two mandatory criteria: being a higher education student and managing personal information on digital platforms. We received participants' consent to use their anonymous responses to the questionnaire. Participants were asked upon completion of the questionnaire to pass on the link to other potential respondents who meet the study criteria. We used IBM-SPSS statistical software for descriptive and explanatory procedures, including t-tests for paired samples.

Findings

We examined the actual and ideal utilization of PIM practices according to the participants' self-reports. In addition, we performed t-test for paired samples to examine whether gaps between actual and ideal utilization of

practices were significant. Table 1 summarizes the findings regarding the practice utilization (actual and ideal) by mean scores of their utilization. It also presents the results of the t-test for paired samples.

Table 1. Mean scores and SD of actual and ideal practice utilization, and t-test for paired samples (N=287)

	PIM Practices	Actual usage \bar{x} (SD)	Ideal usage \bar{x} (SD)	t
1	Navigating computer's folders to retrieve information	4.08 _(0.98)	4.17 _(1.03)	-1.14
2	Saving information items in folders	4.00 _(1.05)	4.33 _(0.95)	-4.71**
3	Using "search" to retrieve email messages	3.90 _(1.24)	3.83 _(1.30)	1.03
4	Thinking of retrieval while saving information	3.85 _(1.09)	3.62 _(1.32)	2.52*
5	Saving information items according to subject	3.84 _(1.13)	4.24 _(1.01)	-5.77**
6	Using digital calendar	3.83 _(1.35)	4.13 _(1.16)	-4.46**
7	Capturing information by taking photos with mobile phone	3.77 _(1.16)	4.17 _(1.08)	-5.54**
8	Sending email messages to myself	3.76 _(1.24)	3.84 _(1.26)	-1.25
9	Giving meaningful names to files	3.59 _(1.29)	4.01 _(1.15)	-6.25**
1	Deleting irrelevant information	3.57 _(1.23)	4.11 _(1.18)	-6.34**
1	Backing-up personal information	3.52 _(1.24)	4.24 _(1.08)	-9.09**
1	Backing-up photos	3.50 _(1.32)	4.23 _(1.07)	-9.41**
1	Deleting similar photos	3.44 _(1.25)	3.79 _(1.30)	-3.87**
1	Using "search" to retrieve information on the computer	3.44 _(1.24)	3.74 _(1.28)	-4.40**
1	Dedicating time to organize the information space	3.34 _(1.15)	3.84 _(1.14)	-6.13**
1	Giving meaningful names to emails	3.22 _(1.40)	3.80 _(1.27)	-7.14**
1	Deleting email messages from inbox	3.22 _(1.33)	3.77 _(1.26)	-6.53**
1	Organizing passwords in a list	3.16 _(1.51)	3.62 _(1.45)	-5.27**
1	Organizing personal photos	3.13 _(1.37)	3.95 _(1.27)	-9.36**
2	Navigating between folders to locate email messages	3.08 _(1.52)	3.87 _(1.31)	-8.71**
2	Using tags on the computer	2.82 _(1.38)	3.57 _(1.39)	-9.12**
2	Saving email messages in folders	2.72 _(1.49)	3.73 _(1.38)	-11.47**
2	Saving previous versions of files	2.64 _(1.31)	3.69 _(1.38)	-11.32**
2	Using Apps to manage personal information	2.55 _(1.41)	3.41 _(1.43)	-10.13**
2	Using tags to manage email messages	2.52 _(1.44)	3.43 _(1.45)	-10.77**
2	Saving information items in a pile	2.36 _(1.33)	2.51 _(1.56)	-1.37
2	Deleting information to avoid saving decisions	2.03 _(1.25)	2.80 _(1.61)	-8.16**
2	Asking others for help to retrieve information	1.60 _(0.99)	1.85 _(1.30)	-3.62**
2	Asking others for help to save information	1.56 _(1.02)	1.76 _(1.22)	-2.48*
3	Asking others for help to organize information	1.52 _(0.93)	1.82 _(1.24)	-4.64**

*p<.05, **p<.01

Results regarding the actual usage of practices reveal that the mean scores of 20 out of 30 practices were equal to or higher than 3, indicating that participants used a variety of PIM practices. The ideal usage of the practices according to participants' perceptions was equal to or higher than 3 in 25 out of 30 practices, indicating that participants wished to utilize even more practices for managing personal information.

Gaps between actual and ideal usage of practices were significant for 27 of 30 practices. In 25 of 27, participants indicated they would have liked to use these practices more than they actually do. The two practices they had wished to use less were thinking of retrieval while saving information and using “search” to retrieve email messages. Gaps were extremely high regarding practices that are utilized to arrange information items, e.g., backing up information items, using tags, organizing photos, managing file versions, and using apps for information management.

Discussion

We examined students' PIM behavior based on their actual usage of PIM practices, their ideal perceptions regarding the usage of these practices, and the characteristics of the gaps between the two. Overall, two-thirds of the 30 practices were frequently used by the students, indicating that they need to utilize numerous practices to effectively manage personal information. These results show that PIM cannot longer be described as an activity that demands only piling and filing practices in order to save information for its future retrieval (Malone, 1983), but rather becomes a complex activity that includes multiple practices (Jones et al., 2015).

Students indicated they preferred to organize information items in folders according to subjects, and navigated between folders to retrieve information items (Bergman et al., 2008). Even though advances in digital platforms allow people to find and retrieve information items regardless of their exact location using “search” engines, students still prefer to manage their information in folders. A possible reason is the structure of folders and sub-folders, which is suitable for students who need to organize information according to semesters and courses (Trace & Karadkar, 2017).

Alongside the usage of traditional PIM practices, we can see a shift towards utilizing more updated practices related to managing information on online and mobile platforms (Alon & Nachmias, 2020; Jones et al., 2015). Participants used more tagging practices than described in previous studies (Bergman, Gradovitch, Bar-Ilan, & Beyth-Marom, 2013), they organized less their email messages (Whittaker, Bellotti, & Gwizdka, 2007), and used more 'search' practices to locate information items than described in the literature (Benn et al., 2015). These changes could be linked to the necessity to manage information on online and mobile platforms. However, since these findings are based on self-reports, further examination is needed.

Students' perceptions regarding their ideal PIM behavior show that they would like to utilize even more practices compared to their actual use of practices in order to effectively manage information. The most desirable practices were related to the arrangement of the personal information space (e.g. backing up, tagging, organizing photos, managing versions, and using apps). These findings reinforce the challenge of students to manage growing amounts of personal information and to cope with cluttered information spaces (Schull, 2018; Sweeten, Sillence, & Neave, 2018).

The most intriguing findings are the significant gaps between the actual and ideal usage of the majority of practices, specifically common PIM practices. This suggests that students are not satisfied with their management of personal information. These results strengthen the findings of Robinson and Johnson (2012) who stated that students are not happy with their information management. Large gaps associated with negative feelings could affect the PIM experience and cause frustration and stress (Higgins, 1987). This indicates the importance of implementing a PIM literacy program to be in higher education institutes in order comply with students' needs, particularly to narrow the gaps between actual and ideal PIM behavior.

Based on our findings, we established three principles for the construction and implementation of a PIM literacy program in higher education. The first principle includes a reflective process on students' PIM practices, group discourse on PIM behavior, and exposure to a variety of information technologies. The reflective process could assist in raising students' awareness of their PIM behavior, particularly regarding their usage of practices (Hardof-Jaffe & Aladjem, 2018). The second principle includes group discourse that encourages students to talk about PIM practices with their colleagues. Students would be able to share their knowledge and personal experience regarding PIM practices, and learn about new ways to manage their information spaces (Alon & Nachmias, 2019). The third principle entails the encounter of new platforms for managing personal information, both by the instructor

of the program and by peers. Consequently, students can find the most suitable solutions for managing their learning tasks (Cushing & Dumbleton, 2017).

We believe that a training program based on these three principles would improve students' PIM skills. Furthermore, the program may reduce students' sense of information overload and frustration and increase their efficacy to cope with PIM challenges.

References

- Alon, L., Hardof-Jaffe, S., & Nachmias, R. (2019). How knowledge workers manage their personal information spaces: Perceptions, challenges, and high-level strategies. *Interacting with Computers, 31*(3), 303-316.
- Alon, L., Forkosh Baruch, A., & Nachmias, R. (2018, June). "... otherwise I will get lost": Affective aspects of personal information management among preservice teachers. In *Proceedings of EdMedia: World Conference on Educational Media and Technology* (pp. 537-547). Amsterdam, Netherlands: Association for the Advancement of Computing in Education (AACE).
- Alon, L., & Nachmias, R. (2019). Principles for the implementation of personal information management literacy program in higher education. In *Proceedings of 13th Annual International Technology, Education and Development Conference* (pp.1274-1282). Valencia, Spain: IATED.
- Alon, L., & Nachmias, R. (2020). Gaps between actual and ideal personal information management behavior. *Computers in Human Behavior, 107*.
- Benn, Y., Bergman, O., Glazer, L., Arent, P., Wilkinson, I. D., Varley, R., & Whittaker, S. (2015). Navigating through digital folders uses the same brain structures as real world navigation. *Scientific Reports, 5*, 1-9.
- Bergman, O., Beyth-Marom, R., & Nachmias, R. (2008). The user-subjective approach to personal information management systems design: Evidence and implementations. *Journal of the American Society for Information Science and Technology, 59*, 235-246.
- Bergman, O., Gradovitch, N., Bar-Ilan, J., & Beyth-Marom, R. (2013). Folder vs. tag preference in personal information management. *Journal of the American Society for Information Science and Technology, 64*(10), 1995-2012.
- Bergman, O., & Whittaker, S. (2016). *The science of managing our digital stuff*. MIT Press.
- Bergman, O., & Yanai, N. (2018). Personal information retrieval: Smartphones vs. computers, emails vs. files. *Personal and Ubiquitous Computing, 22*(4), 621-632.
- Cushing, A. L., & Dumbleton, O. (2017). 'We have to make an effort with it': Exploring the use of stages to help understand the personal information management needs of humanities and social science doctoral students managing dissertation information. *IFLA Journal, 43*(1), 40-50.
- Hardof-Jaffe, S., & Aladjem, R. (2018). Learner perception of personal spaces of information (PSIs)-A mental model analysis. *Journal of Interactive Learning Research, 29*, 189-208.
- Higgins, E.T. (1987). Self-discrepancy: A theory relating self and affect. *Psychological Review, 94*, 319-340.
- Jones, W. (2007). Personal information management. *Annual Review of Information Science and Technology, 41*(1), 453-504.
- Jones, W., Capra, R., Diekema, A., Teevan, J., Perez-Quinones, M., Dinneen, J. D., & Hemminger, B. (2015, April). "For telling" the present: Using the delphi method to understand personal information management practices. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (pp. 3513-3522). ACM.
- Malone, T. W. (1983). How do people organize their desks?: Implications for the design of office information systems. *ACM Transactions on Information Systems (TOIS), 1*, 99-112.
- Robinson, S., & Johnson, F. (2012). The process and affective environment of students' personal information management. *Enhancing Learning in the Social Sciences, 4*(2), 1-13.

- Rowe, Z. O., Wilson, H. N., Dimitriu, R. M., Breiter, K., & Charnley, F. J. (2017). The best I can be: How self-accountability impacts product choice in technology-mediated environments. *Psychology & Marketing, 34*(5), 521-537.
- Schull, N. D. (2018). Digital containment and its discontents. *History and Anthropology, 29*, 42-48.
- Sweeten, G., Sillence, E., & Neave, N. (2018). Digital hoarding behaviours: Underlying motivations and potential negative consequences. *Computers in Human Behavior, 85*, 54-60.
- Trace, C. B., & Karadkar, U. P. (2017). Information management in the humanities: Scholarly processes, tools, and the construction of personal collections. *Journal of the Association for Information Science and Technology, 68*(2), 491-507.
- Vitale, F., Odom, W., & McGrenere, J. (2019, June). Keeping and discarding personal data: Exploring a design space. In *Proceedings of the 2019 on Designing Interactive Systems Conference* (pp. 1463-1477). ACM.
- Whittaker, S. (2011). Personal information management: From information consumption to curation. *Annual Review of Information Science and Technology, 45*(1), 1-62.
- Whitham, R., & Cruickshank, L. (2017). The function and future of the folder. *Interacting with Computers, 29*(5), 629-647.
- Whittaker, S., Bellotti, V., & Gwizdka, J. (2007). Everything through email. In W. Jones & J. Teevan (Eds.), *Personal information management* (pp. 167-189). Seattle: University of Washington Press.
- Whittaker, S., Matthews, T., Cerruti, J., Badenes, H., & Tang, J. (2011, May). Am I wasting my time organizing email?: A study of email refinding. In *Proceedings of The SIGCHI Conference on Human Factors in Computing Systems* (pp. 3449-3458). ACM.
- Whittaker, S., & Sidner, C. (1996). Email overload: Exploring personal information management of email. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 276-283). ACM.